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NATIONAL AERONAUTICS NASA
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SECTION 15767

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SECTION 15767

ELECTRIC RESISTANCE HEATING 10/03

NOTE: Delete, revise, or add to the text in this
section to cover project requirements. Notes are
for designer information and will not appear in the
final project specification.

This section covers electric unit heaters. Drawings
should indicate capacity, voltage, rating,
control-circuit voltage, cfm, sizes, mounting
height, and other pertinent data.

PART 1 GENERAL

1.1 REFERENCES

NOTE: The following references should not be
manually edited except to add new references.
References not used in the text will automatically
be deleted from this section of the project
specification.

The publications listed below form a part of this section to the extent
referenced:

UNDERWRITERS LABORATORIES (UL)

UL 1096 (1986; 4th Ed; Rev thru Jan 30, 1988)
Electric Central Air Heating Equipment

1.2 GENERAL REQUIREMENTS

NOTE: If Section 16003 GENERAL ELECTRICAL
PROVISIONS is not included in the project
specification, applicable requirements therefrom
should be inserted and the following paragraph
deleted.

Section 16003 GENERAL ELECTRICAL PROVISIONS applies to work specified in this section.

Fabrication Drawings shall be submitted for electric heaters consisting of fabrication and assembly details to be performed in the factory.

Equipment and Performance Data shall be submitted for electric heaters including life, test, system functional flows, safety features, and mechanical automated details.

Manufacturer's Instructions shall be submitted for electric heaters including special provisions required to install equipment components and system packages. Special notices shall detail impedances, hazards and safety precautions.

1.3 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01330 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project. Submittals should be kept to the minimum required for adequate quality control. Include a columnar list of appropriate products and tests beneath each submittal description.

The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

SD-02 Shop Drawings

Fabrication Drawings shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

Installation drawings shall be submitted for electric heaters in accordance with the paragraph entitled, "Installation," of this section.

SD-03 Product Data

Equipment and Performance Data shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

Manufacturer's catalog data shall be submitted for the following items:

Electric Heaters
Heating Element
Controls
Casings

Propellers and Motors

SD-08 Manufacturer's Instructions

Manufacturer's Instructions shall be submitted in accordance with paragraph entitled, "General Requirements," of this section.

PART 2 PRODUCTS

2.1 PRODUCT STANDARDS

Unit electric heaters shall conform to the requirements of UL 1096.

2.2 DESCRIPTION

Unit electric heaters shall be suspended type and shall be arranged for discharge of air as indicated.

Unit electric heaters shall have not less than indicated capacity and shall conform to requirements specified herein.

Unit electric heaters shall be factory rewired, ready for field terminal connections.

2.3 CASINGS

Casings with smoothly contoured propeller orifice rings shall be constructed of not less than 20-gage 1.0 millimeter cold-rolled carbon steel. Casing surface finish shall include phosphate pretreatment, prime coating, and baked-enamel finish.

2.4 AIR DISTRIBUTION

[Vertical discharge units shall be fitted with louver-cone diffusers.]

[Horizontal units shall be provided with adjustable single- or double-deflection louvers.]

2.5 HEATING ELEMENT

Element construction shall consist of a resistance wire insulated by highly compacted refractory insulation protected by a sealed metallic-finned sheath. Component materials shall be as follows:

Resistance wire shall be not less than 20-helix wound alloy approximately 80-percent nickel and 20-percent chromium.

Refractory insulation shall be magnesium oxide with a resistance of not less than 50,000-ohms after exposure to an ambient temperature and humidity of 90 degrees F 32 degrees C and 85 plus or minus 5-percent relative humidity, respectively, for not less than 24 hours.

Sheathing shall consist of aluminum fins cast around an internal steel sheath containing refractory insulation and resistance wire or

carbon-steel fins permanently attached to a tubular carbon-steel sheath containing refractory insulation and resistance wire and with external surfaces porcelainized.

[Maximum surface temperature of porcelain-protected steel sheathing shall be [700] [_____] degrees F [370] [_____] degrees C.]

[Maximum surface temperature of cast-aluminum sheathing shall be [500] [_____] degrees F [260] [_____] degrees C.]

2.6 CONTROLS

[Units up to and including 5 kilowatts shall be fitted with integral controls including thermal overload cutout switches, necessary transformers, liquid-vapor system, and low-mass bimetal thermostat as required. Cutout switch shall be automatically resettable.]

[Unit shall be provided with a remote unfused disconnect switch that opens ungrounded conductors in the OFF position and a thermostat with integral controls including thermal overload cutout switches, magnetic contactors, necessary transformers, and thermostat protection as required. Cutout switches shall be automatically resettable.]

Wall-mounted thermostats shall be complete with thermometer, mechanical high-limit stop, calibrated operator, and an adjustable heater to effect anticipation and to prevent override of space temperature. Range shall be between 55 and 105 degrees F 12 and 41 degrees C. Differential shall not exceed 1.5 degrees F 1 degrees C. Thermostat shall be rated for operation at 24 volts, 60 hertz. Transformers, wiring, and devices necessary to meet this requirement shall be provided. Cases shall be finished in brushed or satin chrome.

2.7 PROPELLERS AND MOTORS

Propellers shall have [mill-aluminized] [galvanized-steel] [all-aluminum blades] and shall be statically and dynamically balanced to within 0.5 percent. Units shall be provided with fan-inlet safety guards.

Propellers and motors shall be certified by the AMCA for air performance and noise level.

Motors shall be protected against damage by the heating element and shall be resiliently mounted.

Motors shall conform to Section 16225 MOTORS except that load-matched and custom-designed motors may be used and shall be so identified on the shop drawings. Motors not so identified shall conform to the requirements specified.

Subfractional and fractional custom-designed or applied motors may deviate from the preceding motor requirements as follows:

Shaded-pole motors rated less than 1/6-horsepower 125 watt may be used for direct-drive service.

Permanent split-capacitor, split-phase, and capacitor-start motors rated 1/4-horsepower 185 watt and less may be used for direct-drive service.

Split-phase and capacitor-start motors, rated 1/4-horsepower 185 watt and less, may be used for belt-drive service.

Motor bearings may be manufacturer's standard prelubricated sleeve type except that motors shall have antifriction thrust bearings, when specified. Lubricant provisions shall be extended service requiring replenishment not more than twice per year of continuous operation.

Motor identification plate shall be manufacturer's standard.

Motor speed and control shall be unit-heater manufacturer's standard.

PART 3 EXECUTION

3.1 INSTALLATION

Unit heaters shall be installed in accordance with the manufacturer's instructions at the mounting heights indicated.

3.2 FIELD TESTING

Unit heaters shall be demonstrated to operate satisfactorily in the presence of the Contracting Officer.

Unit heaters shall be cycled five times, from start to operating thermal conditions to off, to verify adequacy of construction, system controls, and component performance.

An operational test shall be conducted for a minimum of 6 hours.

-- End of Section --